Technical Attachment

Configuring WarnGen to Include Interstate Mile Marker Locations in Warnings

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1. Introduction

This paper describes the method used at WFO Norman to allow WarnGen to automatically include a range of interstate mile markers in the warning text included within the warning polygon. This method has also been tested and utilized at WFO Omaha. First, a list of latitude/longitude pairs is needed for the mile markers. This information for Oklahoma was obtained through the Oklahoma Department of Transportation and the Oklahoma Turnpike Authority. Once those data are obtained, the steps below indicate what is necessary to create "Geographic Entity Lookup Tables" (GELTs) that WarnGen will use, and the additions needed in the WarnGen template.

2. Create .id file

First, create an .id file with the latitude, longitude and mile marker information for an interstate. Separate files are required for each interstate used. If an interstate crosses state lines within the CWA, separate files are also required for that interstate in each state. Use a format similar to /awips/fxa/data/localizationSets/LLL/wwa_warn_cities.id. Following is an abbreviated example from the i-40.id file used at WFO Norman:

```
216
   1   35.227   -99.999   p     1     0|1
   2   35.227   -99.991   p     2     1|1
   3   35.230   -99.813   p     3     2|1
   4   35.245   -99.726   p     4     3|1
   5   35.263   -99.643   p     5     4|1
  (continue with additional data points)
 216  35.402   -96.379   p   216   217|1
```

The first number on a line by itself should be the total number of data points in the file. The format of the other lines is sequence number, latitude, longitude, p (for a point location as opposed to an area), sequence number repeated, mile marker number, and the goodness number. Since all of the data points are to be used, a goodness number of "1" will be used for all entries. Coordinates for every mile marker should be used, such that WarnGen can successfully find the range of values.

Proper format of the file is crucial in order to obtain the desired results. Specifically, it is important that there is a blank space before the sequence number at the beginning of each data line; the latitude and longitude should have only three digits after the decimal point; and that there are two spaces between consecutive numerical data in the line, especially between the second sequence number and the mile marker number. The columns should also be aligned vertically, which will require extra spaces at the beginning of lines with single digit or double digit sequence numbers. Otherwise, follow the example from wwa_warn_cities.id as closely as possible.

3. Creating GELT files

Although there may be other methods to make the GELT (Geographic Entity Lookup Table), the following is the method used at WFO Norman for this project.

Place the .id file (i-40.id in this example) in the /tmp directory of one of the workstations. On that workstation as user *fxa*:

cd /tmp
/awips/fxa/bin/makeGeoTables
Enter input gelt name: <enter>
Enter geo file: /awips/fxa/data/localizationDataSets/OUN/wwaTables.sup
Enter grid size: 600
Enter cartographic data: none
Use (s)hape file, (i)d file, (b)oth, or make (o)ne entity table: i
Enter filename: /tmp/i-40.id
Use (s)hape file, (i)d file, (b)oth, or make (o)ne entity table: <enter>
0 areas grown, 216 cached points
0 entities defined, 0 cross matched
Enter output gelt name: i40mm

The bold type indicates output from the makeGeoTables program. All values shown are from the WFO Norman configuration and are for example purposes only. File names and site identifiers will vary by site, and grid size may vary. Locate the grid size by finding the value assigned to the TDIM variable in the /awips/fxa/data/localization/scripts/makeWWAtables.csh script.

This will create six files, all beginning with the output GELT name you selected (in this case, i40mm) with the following six extensions: .entity, .EW, .gelt, .id, .NS, .table . After creating the GELT files, check the output .id file to make sure that it looks similar to the input .id file. If there is an extra column of data in the output file, there is likely a problem with the format of the input .id file. If the output .id file looks correct, move all of these files to the /awips/fxa/data/localizationDataSets/LLL/ directory of your test workstation.

4. Incorporating in WarnGen templates

After the mandatory bullets in a WarnGen template (such as wwa_tor.preWWA), add a section that will incorporate the range of interstate mile markers if appropriate:

```
{ ^ Interstate mile markers
<AREA |file=i35mm |area=wwa_counties
        |output_field=1 |sort_by=[0]
        |item_format=[2101][2701] |trail=.
        |lead=THIS INCLUDES INTERSTATE 35 BETWEEN MILE MARKERS~>

<AREA |file=i40mm |area=wwa_counties
        |output_field=1 |sort_by=[0]
        |item_format=[2101][2701] |trail=.
        |lead=THIS INCLUDES INTERSTATE 40 BETWEEN MILE MARKERS~>

<AREA |file=i44mm |area=wwa_counties
        |output_field=1 |sort_by=[0]
        |item_format=[2101][2701] |trail=.
        |lead=THIS INCLUDES INTERSTATE 44 BETWEEN MILE MARKERS~>
}
```

At WFO Norman, this template change has been implemented by placing the above code within curly brackets indicating an operator-selectable field. The inclusion of this code has been turned on by default by adding the carat (^) after the first bracket.

After adding this section to your template in /dsdata/customFiles, or wherever your template resides, relocalize your test workstation with the –wwa flag.

With the inclusion of this section, if a portion of an interstate is included in a warning polygon using WarnGen, the template output will look something like…

"* LOCATIONS IN THE WARNING INCLUDE ERICK AND TEXOLA.

THIS INCLUDES INTERSTATE 40 BETWEEN MILE MARKERS 0 AND 13.

(CALLS TO ACTION)…"

If there are no interstate mile markers included in a warning polygon, no additional output will be created by the additions to the template.

5. Moving Files to Other Workstations

Once this has been successfully tested, the GELT files can be copied to the /awips/fxa/data/localizationDataSets/LLL/ directory on other workstations. Finally, run a new –wwa localization on each workstation to incorporate these changes in the WarnGen templates. A copy of the GELT files should also be placed in a safe location in case the files get removed from the localizationDataSets directory.

6. Issues

This paper documents how to utilize these mile marker locations in WarnGen, but it is recommended that the mile markers also be configured to display on the D2D window. The latitude and longitude data from the .id file can also be reformatted to an .lpi file similar to others found in /awips/fxa/nationalData, and then placed in that directory. The goodness values in this file can be different for each mile marker location to take advantage of the progressive disclosure feature as described in the AWIPS System Manager's Manual. Steps 7 - 15 from Watson (2000) describe what files need to be edited to include a new map background, and these can be used here with one main adjustment. Since point data from an .lpi file are being added instead of a shapefile as in Watson (2000), the entry in XYZ-localDataKeys.txt listed in Step 12 should look similar to:

```
1019 |     | | | | | |NAME |mileMarkers | .lpi| Mile Markers
```

Where XYZfin has been replaced with the file name of the .lpi file created (in this case "mileMarkers"), and ".lpi" has been added between the 9th and 10th pipes instead of a blank space.

Attempts to use locations from different GELT files in the same sentence in the WarnGen template such as the LOCATIONS IN THE WARNING SECTION section have proven unsuccessful. As an alternative, the interstate references have been placed just after the mandatory LOCATIONS section of the WarnGen template. Similarly, attempts to assign all of the interstates into the same sentence in the WarnGen output have also been unsuccessful. Thus, the method described here will output a different sentence for each interstate within the warning polygon. This will cause some excessive wording when more than one interstate is affected such as in metropolitan areas.

This output will include a range of mile markers on an interstate if the warning polygon includes as few as two mile markers, which may lead to potentially undesired output such as, THIS INCLUDES INTERSTATE 40 BETWEEN MILE MARKERS 15 AND 16, if the warning polygon barely includes an interstate. The WarnGen operators should be made aware of this potential and manually review the warning text before issuing.

This process will use the lowest and highest number mile marker boundaries that are found within the warning polygon, even if the polygon does not include the entire range of mile markers between the highest and lowest. As noted in Sec. 2, if an interstate crosses a state boundary but remains in your county warning area, you will need to have a separate GELT and template entry for each state's section of the interstate since the output will use the lowest and highest mile marker in the warning polygon, even if they are in different states. For example, a warning including I-80 from mile markers 440 to 455 in Nebraska, and 0 to 20 in Iowa, the output would read, INTERSTATE 80 BETWEEN MILE MARKERS 0 AND 455, if the same GELT was used.

7. Reference

Watson, J., 2000: *Installing and Displaying Urban Map Backgrounds on AWIPS*. Eastern
        Region AWIPS Technical Note No. 5.0-05, 4pp. NWS Eastern Region Headquarters.

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